

AMENDMENTS TO THE CLAIMS

1. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals and deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites ~~V2 and V5~~, standard 12 lead electrode site V2 replaced by an electrode position Vc, which is defined to be on the sternum directly between the standard electrode sites V1 and V2, plus at least one electrode positioned substantially level with V5 on the right anterior axillary line, and at least one further electrode positioned on each of the right hand side and left hand side of the body, ~~and~~ wherein said ECG signals are synthesized from data obtained from less than ten electrode sites.

2. (currently amended) A method as claimed in claim 1 wherein the electrode sites are located at:

V2: the standard 12 lead electrode site V2 replaced by the electrode position Vc;

V5: the standard 12 lead electrode site V5;

V5R: level with V5 on the right anterior axillary line;

RA: the standard 12 lead electrode site RA (arm, shoulder, wrist or hand); and

LA: the standard 12 lead electrode site LA (arm, shoulder, wrist or hand).

3. (original) The method of claim 1, wherein said further electrodes on the right hand side and left hand side of the body are placed on the torso substantially level with the upper portion of the limbs.

4. (currently amended) A method as claimed in claim 1 wherein the electrode sites are located at:

V2: the standard 12 lead electrode site V2 replaced by the electrode position Vc;

V5: the standard 12 lead electrode site V5;

V5R: level with V5 on the right anterior axillary line;

R: anywhere in the region of the right hand side of the body, between the front upper chest above the level of the heart and the right arm, shoulder or hand; and

L: anywhere in the region of the left hand side of the body, between the front upper chest above the level of the heart and the left arm, shoulder or hand.

5. (currently amended) A method as claimed in claim 3 wherein the electrode sites are located at:

V2: the standard 12 lead electrode site V2 replaced by the electrode position Vc;

V5: the standard 12 lead electrode site V5;

V5R: level with V5 on the right anterior axillary line;

RC: on the upper chest of the body, at the same height as the manubrium and on the right mid-clavicle line; and

LC: on the upper chest of the body, at the same height as the manubrium and on the left mid-clavicle line.

6. (canceled)

7. (canceled)

8. (canceled)

9. (canceled)

10. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising a) receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals, b) deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites V2 and V5 plus at least one electrode positioned substantially level with V5 on the right anterior axillary

line, and at least one further electrode positioned on each of the right hand side and left hand side of the body, c) deriving an ECG signal from a temporary electrode that is not connected for the full duration the ECG measurement, and d) The method of claim 7,
further comprising defining a reference potential for each temporary electrode from one of the following options: the electrical potential of an ECG electrode; the electrical potential of a different temporary electrode or a potential formed by a combination of ECG electrode(s) and/or temporary electrode(s).

11. (canceled)

12. (canceled)

13. (canceled)

14. (canceled)

15. (canceled)

16. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising a) receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals, b) deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites V2 and V5 plus at least one electrode positioned substantially level with V5 on the right anterior axillary line, and at least one further electrode positioned on each of the right hand side and left hand side of the body, and c) deriving an ECG signal from a temporary electrode that is not connected for the full duration the ECG measurement, A method as claimed in claim 7 wherein at least one temporary electrode is located at any point on the right arm, shoulder or hand.

17. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising a) receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals, b) deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites V2 and V5 plus at least one electrode positioned substantially level with V5 on the right anterior axillary line, and at least one further electrode positioned on each of the right hand side and left hand side of the body, and c) deriving an ECG signal from a temporary electrode that is not connected for the full duration the ECG measurement. A method as claimed in claim 7 wherein at least one temporary electrode is located at any point on the left arm, shoulder or hand.

18. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising a) receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals, b) deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites V2 and V5 plus at least one electrode positioned substantially level with V5 on the right anterior axillary line, and at least one further electrode positioned on each of the right hand side and left hand side of the body, and c) deriving an ECG signal from a temporary electrode that is not connected for the full duration the ECG measurement. A method as claimed in claim 7 wherein the temporary electrode(s) are connected at a different time from when the first set of ECG signals is acquired, or equivalently, activated temporarily, and the subject-specific transformations retrospectively calculated.

19. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising a) receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals, b) deriving at least one further ECG signal using predetermined transformation(s) on said

first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites V2 and V5 plus at least one electrode positioned substantially level with V5 on the right anterior axillary line, and at least one further electrode positioned on each of the right hand side and left hand side of the body, and c) deriving an ECG signal from a temporary electrode that is not connected for the full duration the ECG measurement, A method as claimed in claim 7 wherein a temporary electrode, after initial use, is used to perform functions other than that of supplying electrocardiogram signal data.

20. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising a) receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals, b) deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites V2 and V5 plus at least one electrode positioned substantially level with V5 on the right anterior axillary line, and at least one further electrode positioned on each of the right hand side and left hand side of the body, and c) deriving an ECG signal from a temporary electrode that is not connected for the full duration the ECG measurement, The method of claim 7 wherein an input connection to a measurement means or device used to obtain a signal from an ECG electrode(s) has a secondary use to obtain a signal from a temporary electrode.

21. (currently amended) A method of synthesizing electrocardiographic (ECG) signals comprising a) receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals, b) deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein the first group of electrodes comprises the standard 12 lead electrode sites V2 and V5 plus at least one electrode positioned substantially level with V5 on the right anterior axillary line, and at least one further electrode positioned on each of the right hand side and left

hand side of the body, wherein said ECG signals are synthesized from data obtained from less than ten electrode sites, and c) The method of claim 1 wherein the method further comprises switching an electrode between separate modes of operation wherein in a first mode, the electrode measures an ECG signal and in a second mode, the electrode forms a reference electrical connection between a subject and an ECG measurement means.

22. (previously presented) The method of claim 1 further comprising:

- applying a plurality of electrodes on a subject's body to enable the measurement of a set of ECG signals for that subject;
- detecting subject's body posture; and
- selecting or modifying the set of transformations on the basis of the subject's body posture.

23. (previously presented) The method of claim 1 wherein a posture of said body is detected by an accelerometer, tilt sensor or manual switch.

24. (previously presented) The method of claim 1, further comprising the steps of:

- calculating a simulation matrix for at least one temporary signal from the first set of data or a subset thereof;
- applying a simulation matrix to the second set of ECG signals to generate a simulated temporary signal; ~~and~~
- applying a fixed derivation matrix to the second data set plus the simulated signal to define an unmeasured ECG lead; and
- adapting one or both of said matrices to compensate for subject specific variations in posture and movement.

25. (original) The method of claim 24 wherein the method of deriving unmeasured ECG signals comprises forming a matrix R which contains data points from the measured ECG signals, calculating a solution matrix A from the temporary electrode signals, and calculating a matrix sX using $sX(i)=R*A(i)$.

26. (original) The method of claim 25 wherein a matrix M is formed from the first set of ECG signals plus the simulated temporary electrode signals, and further comprising forming a derived matrix $dL(x)=M*B(x)$, where $B(x)$ is a predetermined solution matrix and $dL(x)$ simulates the data that would have been observed at an unmeasured electrode site.

27. (previously presented) The method as claimed in claim 1 wherein the method further comprises measuring a first set of ECG signals, processing said signals to derive a standard 12 lead ECG and displaying said standard 12 lead ECG in real time.

28. (previously presented) The method as claimed in claim 1 wherein the first set of ECG signals is recorded and stored for later processing to derive a standard 12 lead ECG.

29. (original) The method claimed in claim 28 further comprising displaying the derived standard 12 lead ECG signal.

30. (currently amended) A method for obtaining a set of electrocardiographic (ECG) signals of the general type comprising synthesizing ECG signals by receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals and deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein said first group includes at least electrodes located at the following sites:

R and L: placed on or near the right and left upper limbs respectively; and

Vc: placed on the sternum wherein site Vc is located on the sternum directly between the standard electrode sites V1 and V2.

31. (original) A method as claimed in claim 30 wherein sites R and L comprise specifically sites RC and LC placed at the same level as the manubrium on the right and left mid-clavicular lines respectively.

32. (original) A method as claimed in claim 30 wherein sites R and L comprise sites RA and LA placed on the right arm and left arm respectively.

33. (canceled)

34. (currently amended) A method for obtaining a set of ECG signals of the general type comprising synthesizing electrocardiographic (ECG) signals by receiving signals from a first group of electrodes connected to predetermined locations on a human body to acquire a first set of ECG signals and deriving at least one further ECG signal using predetermined transformation(s) on said first set of ECG signals or a subset thereof to form a desired set of signals, wherein said first group includes at least electrodes located at the following sites:

V_m: one of the standard 12 lead electrode sites V4, V5 and V6 ($m=4, 5$ or 6);

V_{nR}: level with one of the standard electrode sites V4, V5 and V6 ($n=4, 5$ or 6) on the right midclavicular line, right anterior axillary line or right midaxillary line respectively; and

V_c: placed on the sternum, wherein V_c is located directly between the standard electrode sites V1 and V2.

35. (original) A method as claimed in claim 34 wherein $m=n$, so that V_{nR} is opposite V_m and is therefore easier to place.

36. (currently amended) A method as claimed in claim 35 wherein ~~in a preferred embodiment,~~ $m=n=5$, so that the sites V_m and V_{nR} are V5 and V5R respectively.

37. (canceled)

38. (currently amended) A method as claimed in claim 30 wherein at least five electrode sites are chosen, wherein said five electrode sites comprise ~~said a~~ V_m site, ~~said a~~ V_{nR} site, said V_c site, said a R site placed on or near the right upper limb and said a L site placed on or near the left upper limb.

39. (previously presented) The method as claimed in claim 30 wherein the method further comprises deriving an ECG signal from a temporary electrode that is not connected for the full duration the ECG measurement.

40. (canceled)

41. (canceled)

42. (previously presented) An apparatus for synthesizing ECG data comprising means arranged to receive measured ECG signals and signal processing means arranged to perform the method steps according to claim 1.

43. (currently amended) The apparatus as claimed in claim 42 wherein said signal processing means ~~is~~ is arranged to implement a linear combination processing array for processing said digitized signals to derive a standard 12 lead ECG.

44. (previously presented) An apparatus as claimed in claim 42 wherein said signal processing means is implemented using a general purpose microprocessor or digital signal processor circuit under software control.

45. (previously presented) The apparatus as claimed in claim 42, wherein the apparatus comprises separate units for processing and displaying ECG signals respectively; and means for interfacing the separate units for processing and displaying the ECG signals.

46. (previously presented) A system for measuring ECG signals comprising a synthesizing apparatus as claimed in claim 42 in combination with means for storing signals from a subset of the group of electrodes, said synthesizing apparatus being operable to process the stored signals from said subset of electrodes to obtain a standard 12 lead ECG.

47. (original) The system as claimed in claim 46 further comprising a set of leads corresponding specifically to said subset of electrodes for obtaining said signals for storage and processing.

48. (previously presented) The system as claimed in claim 46 wherein the means for storing said signal data comprises a removable storage medium.

49. (previously presented) A storage device carrying program instructions for causing a general purpose microprocessor or digital signal processor circuit to implement a method as claimed in claims 1.

50. (previously presented) An apparatus for synthesizing ECG data comprising means arranged to receive measured ECG signals and signal processing means arranged to perform the method steps according to claim 30.

51. (previously presented) A storage device carrying program instructions for causing a general purpose microprocessor or digital signal processor circuit to implement a method as claimed in claim 30.

52. (previously presented) An apparatus for synthesizing ECG data comprising means arranged to receive measured ECG signals and signal processing means arranged to perform the method steps according to claim 34.

53. (previously presented) A storage device carrying program instructions for causing a general purpose microprocessor or digital signal processor circuit to implement a method as claimed in claim 34.

54. (canceled)

55. (canceled)

Respectfully submitted,

A handwritten signature in black ink, appearing to be 'H. Ansari', written over a horizontal line.

By _____
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